

MANAGEMENT OF THE PAINFUL SHOULDER

*Transcription of a Panel Meeting on Therapeutics**

HARRISON L. McLAUGHLIN . . . Moderator

Professor of Clinical Orthopedic Surgery, College of Physicians and Surgeons, Columbia University;
Attending Orthopedic Surgeon, The Presbyterian Hospital

Panel Members

ROBERT LEE PATTERSON, JR.

Assistant Clinical Professor of Surgery (Orthopedics), Cornell University Medical College;
Attending Orthopedic Surgeon, Hospital for Special Surgery

EDWARD B. SCHLESINGER

Assistant Professor of Neurological Surgery, College of Physicians and Surgeons, Columbia University;
Attending Neurosurgeon, Neurological Institute, Columbia-Presbyterian Medical Center

OTTO STEINBROCKER

Assistant Professor of Clinical Medicine, New York University Post-Graduate Medical School;
Attending Physician (Rheumatology), Hospital for Joint Diseases and Lenox Hill Hospital

* Presented at the Monthly Panel Meeting (Fourth Series), at The New York Academy of Medicine.

MODERATOR HARRISON L. MC LAUGHLIN: The subject for discussion this afternoon is *The Management of the Painful Shoulder*. This sounds like a rather simple affair but, as I think you all realize, it is one of the most common, troublesome and complicated subjects in medicine and it cuts across every branch of medicine. There are many distant causes for this syndrome. On the surface all cases appear consistently identical on casual examination, regardless of the primary cause. Because of this variety in the potential causes of a painful shoulder, we have invited three experts here this afternoon to discuss the subject from three different points of view.

Dr. Robert Lee Patterson, Jr., an orthopedic surgeon, will discuss the intrinsic, and shall we say, the mechanical and anatomical aspects of the painful shoulder. Dr. Edward B. Schlesinger, will present his views as a neurosurgeon. Because many of the causes of a painful shoulder are neither surgical, orthopedic, nor neurological, but rather of medical origin, Dr. Otto Steinbrocker will discuss the problem from the viewpoint of the internist.

I should now like to ask Dr. Patterson to initiate the discussion by presenting what might be designated as intrinsic disorders in the shoulder.

DR. ROBERT LEE PATTERSON, JR.: In discussing the surgical aspects of management of the painful shoulder, I shall restrict my remarks to the actual shoulder joint and not include the many varied conditions which can and do cause pain referred to this area, such as Pancoast's tumor of the lung, cervical lesions, cardiac involvement, neuromuscular disease, etc.

If I am correct in assuming that we are not to discuss the results of gross trauma, such as recurrent dislocations, fractures, etc., then it is apparent that surgery of the shoulder is limited to rectifying the various conditions which affect either the bony or the soft part components of the shoulder.

The bony structures which make up the shoulder girdle are the scapula, the clavicle, and the humerus; the soft part elements consist of the tendons of the supraspinatus, infraspinatus, teres minor and subscapularis (called the rotator cuff or tendo-capsular cuff), the tendon of the long head of the biceps, and the various sacs called subdeltoid or subacromial, subscapularis, and subcoracoid bursae.

The scapula is connected with the clavicle at the acromio-clavicular joint, having a synovial lining, articular cartilage surfaces, and interposed fibro-cartilaginous disc, and is subject to all the conditions which affect

any joint. Arthritic changes with symptoms are common whether due to local trauma such as injury or as a result of a generalized systemic rheumatic disease. When there is local pain, tenderness, swelling and restriction of motion due to changes in this acromio-clavicular joint, surgery can be of help. Excision of the outer one inch of the clavicle results in greatly improved motion and, usually, relief of pain.

Changes in the articular surfaces of the head of the humerus or of the glenoid occur as a result of local infection such as tuberculosis, of osteochondritis, from generalized rheumatic diseases or from obstetrical trauma. Fusion of the shoulder joint is still recommended in tuberculosis and for some of the paralyses resulting from obstetrical trauma or from poliomyelitis. However, when there is no disease, when the musculature is good, and the supporting structures such as the tendo-capsular cuff are intact, the "Neer" type of prosthesis should prove increasingly useful.

Injuries to the tendo-capsular cuff occur as a result of severe trauma or a relatively minor one from repeated, small, practically unnoticed traumata. The mechanism of the complete tear may be illustrated as follows: A patient's foot slips, he automatically elevates his arm to protect himself from falling, and the tendon tears. Following this he has pain, is unable to abduct the shoulder, and x-ray films are negative. The diagnosis is based on the history of the injury, physical findings, negative x-rays, and perhaps the use of an opaque medium injected into the joint. If the material extravasates into the bursa, we can be sure the tendon is torn. However, the work of Dr. McLaughlin has shown that the diagnosis can be difficult, and that the time element for operative repair of a torn tendon is not extremely important. Hence one can treat these patients conservatively for a while and wait and see whether, as frequently happens, they will recover spontaneously. If, however, they fail to improve and the diagnosis is suspected, operation is recommended and repair of the defect carried out.

However, not all injuries result in complete tears. The majority are small, incomplete ones which are extremely painful and disabling. Surgery is not indicated in these patients. Local palliative measures and time suffice to give good results.

I believe two points should be stressed when discussing injuries to the rotator cuff: First, that tears, complete or partial, are rare in the young person, under 40-50 years of age. Up to this age the tendons are strong and firm and can pull off the tuberosity of the humerus before

they will tear. However, after the age of 50, most authorities on the subject agree that probably one out of every four subjects examined will show various types of injury or rupture. Because the whole process is one of attrition, loss of fibrillation and normal tensile strength, and because of nature's wonderful method of adaptation to this degenerative process taking place over a long period of time, these patients may have few or no symptoms.

Second, I believe a person who has sustained a partial tear of the cuff should be treated in the same way as a patient who has suffered an injury to any other part of his body. For instance, we rest and protect the incomplete tear of the tendo-achillis. Similarly, the shoulder should be put at rest for a week or so. Probably the best method is in bed with suspension of the arm in forward flexion—abduction and slight external rotation. The use of procaine should be reserved for diagnostic purposes only. The arm should be protected from hard use in occupational activity for from four to six weeks. This does not mean that gentle exercises and local treatment should not be carried out. Immobility of the arm is contraindicated. We believe that by managing these cases properly from the initial stage we can reduce the number of those who develop the chronic painful frozen shoulder syndrome.

By far the most common conditions in which surgery plays a therapeutic role in the management of the painful shoulder are those associated with changes in the soft part elements, namely, the tendo-capsular cuff. An underlying tendinitis with or without calcification accounts for the majority of the shoulders seen by the orthopedic surgeon. Therefore, I shall spend the rest of my allotted time describing the surgical approach to this condition. But first I want to stress the importance of a correct diagnosis.

The term "bursitis" has now become a diagnostic trashbasket and includes conditions formerly known as neuritis, fasciitis, myositis, etc. The subacromial bursa is a large sac, the floor of which lies on the tendo-capsular cuff. As the arm is elevated and rotated the bursa is interposed between the undersurface of the acromion and the tuberosity of the humerus with its tendon attachments. Primary pyogenic bursitis of the shoulder is rare. Anything which injures or irritates this bursa produces a bursitis. For instance, a fall on the outstretched hand, such as occurs in a Colles' fracture, will bruise the bursa by impinging the head of the humerus against the undersurface of the acromion. Changes in the under-

surface of the acromion secondary to arthritis of the acromio-clavicular joint may irritate the bursa; and finally, the most common cause of bursitis is the tendinitis with or without calcification of the tendo-capsular cuff. In our group of cases at the Hospital for Special Surgery, in over 70 per cent of the painful shoulders x-ray showed calcium deposits and we believe there are many more with calcium deposits which x-rays failed to reveal. In these cases it is impossible to interpret an x-ray correctly—where a deposit is, how hard it is, how soft it is, if there are several deposits, etc., unless the films are satisfactory. In spite of years of writing, begging and pleading on the part of the surgeon, there are still radiologists who take these films with the patient lying on a table, who employ stereoscopic views, or who try to rotate the arm of a patient with an acute shoulder. In order to express an opinion concerning therapy, we believe that the following x-ray technique is essential:

1. That the x-rays should be taken with the patient in the standing position;
2. That we have an anterior posterior view of the head of the humerus taken in internal, neutral, and external rotation;
3. That it is never necessary to hurt a patient by the rotation of a painful arm. Lewis has shown that by rotating the patient's body 30 degrees towards the affected shoulder, an excellent external rotation view can be obtained.

Another point we must mention is that out of 456 painful shoulders seen, 80.2 per cent showed a disappearance of the calcium no matter what form of treatment was given. If this be so, where does the surgeon come into the picture? We believe that surgery is indicated only when the patient has symptoms which one can say are caused by a calcium deposit seen on an x-ray. If we are correct in diagnosis, the surgical treatment is to help nature in its attempt to get rid of the underlying foreign body, that is the calcium carbonate and calcium phosphate deposit.

Surgically speaking, there are only two methods of approach: (1) the use of needles; and (2) open procedures.

For more than 20 years I have been extremely interested in the use of needles. I still believe that there is a definite place in our armamentarium for them. In a patient who has an acute shoulder with symptoms of short duration, who has a local point of tenderness, and whose x-rays show a single soft type of calcium deposit, and if the history reveals no previous attempts at needling, then the insertion of two 18-gauge needles

into the bursa or tendon can give dramatic relief. Naturally, if the deposit is in the bursa, the results are quicker and more dramatic because it shows the calcium has already ruptured from the tendon. We use a few cc. of 1 per cent procaine, a two cc. syringe, and a long 22-gauge needle to infiltrate the procaine. Then the two 18-gauge needles are placed in the deposit and irrigation is carried out. When we have finished, we instill 1 cc. or 25 mg. of hydrocortisone into the area. We believe this makes the reaction afterwards less severe.

It is my own feeling that it is not fair to the patient simply to inject procaine and/or steroids in or around the shoulder. One should make every effort to obtain calcium in the syringe. If calcium is obtained on aspiration it indicates that the calcium has ruptured and bursal tension will be relieved; and if it has not ruptured, that the calcium deposit in the tendon has been struck and cure can be expected.

It seems to me I have learned very little in the last 22 years about the use of needles in shoulder pain other than when not to use them.

First, one should not inject a shoulder with procaine, hydrocortisone, or any other drug, when there are multiple deposits in and about the cuff. One may strike one or two deposits, but one will not be able to strike them all. Therefore, the patient may be relieved of the one deposit causing the present symptoms but will still have a shoulder with which future trouble from the other deposits may be expected.

Second, one should not inject a shoulder in which symptoms are minimal and only intermittent, and when x-rays show a small hard deposit. If the deposit is struck, extravasation takes place, a shoulder with acute symptoms for several days results, and the patient cannot understand why he is worse.

Third, one should not irrigate a shoulder, or inject a shoulder, with a deposit or deposits, which also shows considerable restriction of motion due not to pain but to adhesions and disuse. In these cases, the convalescence and return of function can be long, and the patient is usually dissatisfied.

Fourth, one should not resort to the use of needles on a patient with a painful shoulder on whom previous attempts with needles have been tried. Cooperation is poor, the results are usually both unsatisfactory and unappreciated.

We consider the selection of cases for open operation under two headings: The acute shoulder and the chronic shoulder.

1. *The Acute Shoulder:* (a) When the patient has begun to have pain in the shoulder on usage, when he finds it difficult to comb his hair or place his hand behind his back, when he can't sleep on that side at night, and when x-rays show multiple deposits about the cuff, then surgery is indicated.

(b) When the patient has been very uncomfortable for a few days, has been walking the floor at night, is sick from pain, sedatives and dehydration, and when his x-rays show a large single deposit or several small ones, results from open operation are rather dramatic.

2. *The Chronic Shoulder:* (a) When the patient has symptoms from activity whether it is golf or his job, and when he has been given the routine conservative treatments such as physiotherapy, x-ray treatment, a vacation, etc., and when his x-rays show a single deposit or multiple hard deposits, surgical approach offers him the best hope for a good shoulder in the shortest time.

(b) When the patient has chronic symptoms with any form of calcium about the shoulder and function is limited because of adhesions due to the underlying pathologic changes, removal of the deposit breaks the cycle so that the patient can begin a program of rehabilitation and exercises and thus restore function.

We do not believe that any shoulder should be operated upon simply because there is a deposit seen on x-ray film or on fluoroscopy. The purpose of surgery is to alleviate the underlying calcific deposit only if it is giving symptoms. As we mentioned, nature takes care of most of the deposits.

Finally, a few comments about the chronically painful shoulder, the so-called periarthritic, the periarticular arthritic, or more commonly called the chronically painful frozen shoulder. As of this date, I do not feel any form of surgery is indicated in this condition when x-rays show no calcium or other joint pathology.

One of the theories advanced as to the cause of the painful, fixed shoulder is that there is a tenosynovitis of the long head of the biceps. Accordingly, it has been recommended that the long head of the biceps be transplanted to the short head. We have performed this operation several times and do not consider the results worth the operation. Sections taken at operation from any part of the cuff have shown a degenerative tendinitis.

Formerly we used to manipulate most frozen shoulders under a

general anesthesia. Fractures of the tuberosity were common sequelae, freezing immediately occurred after the operation; pain was just as severe—so it is rare to see such a procedure carried out these days. However, if it should be performed, it is advisable to inject 100 or more cc. of normal saline in and about the bursa. The hemorrhage from the breaking up of the adhesions is more easily absorbed and pain is actually lessened after manipulation when saline is used than without it.

We believe that the whole approach to this type of shoulder is one of conservatism. These patients require encouragement and an explanation of all we know, a plea for patience, and reassurance that in the end they will have relief of pain and a satisfactory shoulder. It should be emphasized that only by use of the part can remineralization of a bone take place.

Finally, I should like to state that with proper knowledge of the pathologic changes and their cause, an accurate diagnosis, and a proper evaluation of the patient's disability, surgical management of the painful shoulder can be easy, effective, and of aid to the patient.

MODERATOR MC LAUGHLIN: Thank you, Dr. Patterson.

I should like to point out that Dr. Patterson has sketchily covered one of the three large groups of painful shoulders, that group in which both cause and result are, in general, restricted to the shoulder region. There is another large group in which the pain also involves the neck and in varying degrees the arm, forearm, and sometimes the hand and wrist. By and large, this group is more apt to fall into the jurisdiction of one who is conversant with nerve pathology, and I should like to ask Dr. Schlesinger to continue the discussion and sketch for us the highlights of those painful shoulders in which a neurological lesion is apt to be the most likely primary cause. Dr. Schlesinger!

DR. EDWARD B. SCHLESINGER: With local pain in the shoulder it is natural to expect the earliest and most vigorous attention to be paid to the local structures. Our problem lies in when to look elsewhere. You know you can sit around a gopher hole all day waiting for the gopher to come home. The problem lies in when to stop looking, and the difference between a hungry hunter and a well fed one lies in which one knows when to look elsewhere. I say this with all due humility. My analogy is gross. I say it with humility because we so-called specialists see these patients when their problem has become well defined. It is much more difficult in the early stages when the general physicians see

them, when the complaints may be vague and secondary atrophies and reflex changes may not be present at all.

The commonest cause of shoulder pain in the realm of neurology and neurosurgery lies in the cervical spine at a distance from the shoulder cap itself. The cervical spine is a most intricate and heavily used structure, and one that is concerned with many functions that are not immediately apparent. The present-day interest in things such as whip-lash with its puzzling syndrome is an example of the kind of pathology and syndromes that can follow neck or cervical spine involvement. When the spine is injured, and let us talk in general terms, either by stress, by direct injury or by degenerative changes due to stress and strain of normal living, a certain number of things take place. One of these is that the erector capiti or supporting cervical muscles splint or go into spasm in an attempt to hold the neck in a position which is least painful. When this occurs there is an immediate change in the relationship of the various components which give mobility and stability to the neck. There is tenderness and pain in the region of origin and insertion of the various muscles and in the nuchal ligaments, with irritation of the nerves which course through them. This leads to so-called referred pain of puzzling nature, if you will, and in pain localized to the obvious insertions and attachments of the erector muscles. Such vague myalgic and neuritic pain can very easily resemble direct shoulder pathology. As an example, let us take the puzzling classical tender area at the paravertebral border of the scapula. This pain, which has been given many names and many explanations, is in the region of insertion of the levator scapulae muscles and is merely non-specific evidence of splinting of the erector capiti muscles. Local tenderness in this region has been vigorously treated and misconceived as a trigger point of myositis and many other vague entities. It has been the focal point of many forms of non-specific therapy. Actually, it is the classical early symptom of anything which causes splinting of the erector muscles and a change in normal posture of the cervical spine. At the same time x-rays will show a change in lordosis, possibly with an abnormal fulcrum of motion at one cervical joint. At this juncture in the clinical picture, the patient may have vague radiation of pain over the shoulder-cap rather than the radicular pain which will come later and which is clearly indicative of nerve root compression. The early diffuse radiation over the shoulder-cap which can be so puzzling I touched upon earlier. Now with hard com-

pression or irritation of the nerve root as it courses through the foramen of exit, there will be superimposed a more dramatic and anatomically obvious radiation of pain in the distribution of the involved nerve.

The root which is likeliest to give direct shoulder pain is the fifth cervical root which takes exit between C₄ and C₅. The fifth root largely subserves the deltoid, and the region of the sensory supply is there, and it can cause direct hard shoulder pain. By causing weakness of the deltoid it can create secondary shoulder pathology and true shoulder pain which rapidly goes on to frozen shoulder, a subject I would like to discuss in a separate category. One should remember that root compression in its earlier phases can cause shoulder pain duplicating practically any local lesion.

The third group, and much less common, are cervical cord tumors. These are usually intramedullary, intracord tumors, rather than pressing on the cord. Syringomyelia cysts in the center of the cord compressing the spinothalamic tracts and also tumors which invade the posterior columns, will very often give a very uncomfortable sensation in their realm of distribution. One of the places where this occurs is in the shoulder girdle, and it is not infrequent with high cervical tumors.

The fourth group are lesions of the supraclavicular region. Here we are in very dangerous territory and one must have a very high titer of clinical suspicion. Many of the syndromes are so vague and so bizarre that it is difficult to put one's finger on the exact pathophysiology. However, there are some lesions we do know about which are clear-cut. These include the secondary lesions such as the so-called Pancoast tumor or even the branchial cleft carcinoma, or any similar lesion which invades the supraclavicular region. Again, when early, they are terribly difficult to diagnose. They may cause pleural pain or pain by pressure on the periosteum or actually by tightening the plexus fibers. These are very frequently associated with Horner's syndrome, miosis and narrowing of the palpebral fissure, and should be easily picked up when these appear. However, many of them are missed because x-ray of the chest is not done. There are other lesions in the region such as the cervical ribs, which are very obvious, and which can cause a combination of neural and vascular pain in the shoulder and remain at that level for a long time before the true picture becomes distinct. There are other syndromes of compression both in the clavicular and cervical region about which we don't know as much as we should. These are based

on the dynamics of posture and function and the intimate anatomy of the region. They are becoming more clear now, with arteriography and venography. With modern types of function, a man who spends all day doing one certain thing and hypertrophies certain muscles, has a very different exit and entrance of neurovascular bundles than a man who sits all day and pours over books. We are not scholarly enough or astute enough to recognize many of these syndromes but one should recognize that they are possibilities.

Another group of lesions which can cause shoulder pain, and this group is fascinating and very real, is the actual peripheral nerve injury of the fibers emanating from the brachial plexus after evulsive or stretching injuries. This problem is one that everyone who engages in a special type of practice is faced with two, three or four times a year, and it is worth talking about. Initially the patient will have secondary trauma at work, with paralysis of his serratus secondary to stretching of the nerve. The patient will continue at his job and then there will be a great deal of scurrying about trying to determine what happened. In the meantime the marked weakness of the serratus will contribute to additional stress on the spinati and the way he manages his shoulder. I picked one particular muscle; this could happen with several others following this type of trauma because of the great stress on the spinati and other nearby muscles. There will be a stretching injury of its supplying nerve, and then the expert will say, "This patient obviously has a degenerative disease." Under my eye I have watched him lose function of his spinatus, infra and supra, and serratus.

Involvement of the rhomboid is not commonly caused by an industrial injury, and is not a progressive peripheral nerve lesion. This is a degenerative disease. It should be understood that this sequence of events can and does occur, and it is interesting to speculate why. Of course, the most vulnerable branches of the plexus are the fibers that come off early. The brachial plexus is wonderfully constituted to withstand trauma. Codman uses a word which is very appropriate and one adopts it immediately because it describes the situation so well. That word is "snubbing"—the brachial plexus is snubbed—and if you have ever seen ropes or hawsers used you will understand the way they are held at the end so that they cannot be pulled out. That is what snubbing means, and the major cords and branches of the plexus are snubbed so any trauma is dissipated in the outer layers, tendonous insertions, etc.,

covering the fibers. The fibers that come off earlier are not snubbed and they are much more easily injured, and it explains one of the puzzling aspects of injuries of this kind. I have stressed that a lot. I have been requested to discuss not the common causes but causes that stump one after the local causes have been ruled out, and I apologize for underscoring what may be quite unusual lesions.

To recapitulate then, the cervical spine is quite capable of causing practically every syndrome of pain that one sees locally in the shoulder in terms of pain and disability. It is capable of causing dysfunction which can be incorrectly ascribed to intrinsic disease of the shoulder. It is capable of causing the pain, it is capable of mimicking many of the manifestations of bursitis and of all other local lesions, including cuff tears. One should be aware of these possibilities and examine the cervical spine and keep in mind the various syndromes that I have described.

In closing I should just like to say a few words about frozen shoulder, which undoubtedly appears in this group of cases. The commonest cause of frozen shoulder is unquestionably in the shoulder itself. However, hard unrecognized pain at a distance and, for instance, the C₅ root lesion or a brachial plexus injury or anything which causes splinting in that region is imminently capable of causing a frozen shoulder. No matter how carefully or vigorously the frozen shoulder is treated locally, it will not get well until the initiating or stimulating lesion is taken care of. I have repeatedly seen such frozen shoulders although they are a rarity. They are the short end of the funnel that get to the neurosurgeon obviously because they did not fit the usual picture or did not respond to the usual treatment.

That about covers my area of discussion. I would like to close with a remark that I think Albert Key likes to make: Just because you put a kitten in the oven does not make it a hot cross bun. Just because one has pain in the shoulder one should not forget there are other structures which are capable of causing pain.

MODERATOR MC LAUGHLIN: Thank you, Dr. Schlesinger.

There is another large group of painful shoulders in which the neck usually escapes but in which the syndrome also involves to some extent the extremity and even the hand. I will ask Dr. Steinbrocker to discuss the types of painful shoulder which are important from the point of view of the internist.

DR. OTTO STEINBROCKER: The painful shoulders which are common and important from the point of view of internal medicine and rheumatology consist chiefly of what might be designated as the intrinsic disorders of the shoulder—those conditions which arise from the structures at the shoulder. I don't mean to slight the extrinsic conditions which have been mentioned by Dr. Schlesinger, but the intrinsic are the ones we see most frequently. These intrinsic disorders are intra-articular or extra-articular or articular and non-articular. The articular sort are very much like those we see in other joints of the body. Every type of systemic articular joint disease may affect the shoulder joint as the first indication of onset or in the course of polyarticular rheumatoid arthritis, infectious arthritis, gout, degenerative joint disease, and the many miscellaneous conditions which affect the articulations. The problem is not difficult when there is generalized or polyarticular involvement. When the onset occurs at a single joint, there then may be a quite difficult diagnostic question as to the nature of the disorder.

Systemic disease involving the shoulder, as well as other sites, requires the same principles of management that we think of in connection with any of these diseases. I won't go into them, because it would take too much time, and I am sure that the basic principles and the specific remedies used are pretty clear to all of us. When we encounter monarticular arthropathy as an intrinsic disorder of the shoulder, we may at times have a difficult diagnostic problem as well as a serious therapeutic problem. We can't proceed with intelligent treatment until we have decided just what is going on. I have seen a number of patients, particularly in the older age groups, have onset with symptoms at the shoulder, possibly even at the hand on the same side, without any other joint involvement, or in several instances involvement of only the other extremity in the same way, so it appeared as though we were faced with reflex dystrophy or a peculiar type of joint disease. The characteristic and persistent elevation of the sedimentation rate, the ultimate involvement of other sites,—articulations or muscular structures,—soon tells us what we are dealing with. Until the diagnosis is established, the wise clinician withholds the powerful fire that is available to him today.

Infectious arthritis is rather rare since the advent of the antibiotics. Occasionally we see tuberculous arthritis of the shoulder. The diagnosis sometimes is difficult in the early stages. Later on, the roentgenological picture and other features usually tell us what the nature of the condi-

tion is. The specific treatment of tuberculous arthritis, as in any form of tuberculosis, must be carried out, but very soon the solution is likely to become a surgical orthopedic problem for arthrodesis, as has already been mentioned.

The involvement of the shoulder joint by late syphilis occurs occasionally as a monarticular arthropathy. Here again, the diagnosis may be quite difficult in the early stage, but later, the clinical picture with the characteristic roentgenologic changes will become clear-cut, if there are no serological and neurological signs to point to the correct diagnosis.

The involvement of the shoulder by gout is an occasional occurrence. The treatment is no different than the management of gout in other locations.

Degenerative disease in the shoulder may occur in major or minor forms. When there are degenerative changes at the shoulder with severe symptoms and disability it is advisable to look elsewhere for the cause. The conditions in the cervical spine or in the soft tissues about the shoulder as described by Dr. Patterson and Dr. Schlesinger may be the source of symptoms rather than the changes noted on roentgen films. Rheumatoid arthritis of the intra-articular form is the most common of these intrinsic disorders of the shoulder.

The nonarticular varieties of the painful shoulder are those disorders which Dr. Patterson has mentioned and are encountered frequently even in arthritis clinics. Apart from rheumatoid arthritis, the most common causes of painful shoulder are various fibromyalgias, whatever they may represent and a number of periarticular entities,—calcific tendinitis, bicipital tendinitis which has not received much attention, “frozen shoulder”, and a special form of what I might call “frozen-like” shoulder,—a reflex neurovascular dystrophy of the upper extremity, really a combination of frozen shoulder or periarthrititis, with painful vasomotor disturbance of the hand associated with the painful stiffening of the shoulder. This condition is particularly interesting to the internist because it is associated with intrathoracic pathology, myocardial infarction, pulmonary lesions and infarctions, tuberculosis,—in fact with many conditions which affect various structures which may give referred symptoms to the shoulder; pathologic conditions in the brain, cord, peripheral nerves, the nearby musculature. It may resemble in every way the clinical picture which is produced by traumatic disorders known

as Sudeck's atrophy and various other conditions which are not regarded as medical disorders. The complications which may occur in these medical conditions resemble in every way the neurovascular complications occurring in surgical and neurosurgical conditions.

The management of these painful nonarticular disorders is represented, in our experience, by a different viewpoint. We have a somewhat more favorable attitude towards some of these newer methods than Dr. Patterson seems to have. We find that systemic administration of steroids may have a place, a very valuable place, in the management of some of these disturbances when they are acute. We believe that local administration of steroids has a most useful and effective application in many of these patients. We should not abandon these procedures even if the patient has received them unsuccessfully before, any more than one would refuse to operate for a specific condition once we are convinced it exists, just because the patient had a poor result previously. We have been much impressed by the effectiveness of correct systemic and local administration of steroids for intrinsic, nonarticular pathology. I shall only add that we have observed that the reflex neurovascular disorders, which are seen in association with many of the medical conditions, are quite amenable to the use of steroids, provided the accepted contraindications do not exist, whether or not the patient has a past medical intrathoracic condition or any other lesion as the primary underlying source. We have also found serial stellate ganglion blocks effective in treating many of these patients. The choice of the method of treatment depends entirely upon the situation, upon the availability of the skill and knowledge necessary for the use of either of these procedures. The results that we have observed have been about the same with either method.

In general I would say that the treatment of the painful shoulder, whether associated with medical disorders or not, as seen by the internist or rheumatologist, depends upon the underlying cause and the suitability of the various old and new methods of treatment for the specific patient. We must emphasize certain basic measures: rest in some form, particularly a sling for the extremity for acute symptoms; some physical modality, heat or cold,—if symptoms are acute, the patient may tolerate or get more relief from cold rather than hot applications; exercise as soon as the acute symptoms have subsided in any of these painful conditions except in cases of tuberculosis and neoplasms; analgesics

in one form or other. The particular analgesic given is unimportant provided it is tolerated by the patient and provided the patient can be persuaded to take a quantity sufficient to tide him over the acute symptoms.

Finally, in more chronic conditions, a more analytical approach is necessary. With the advent of new medications now available, we believe these cases must be evaluated with due regard for either the systemic application or local administration of the steroids.

We are convinced, as Dr. Patterson has been, that the two-needle irrigation is an excellent method of treatment for calcific tendinitis. However, since it is often difficult to get patients to submit to that form of treatment, it is also sometimes not expedient to resort to that when simpler methods are available. The progression should be from simple methods, now readily at hand, to the more complicated approach by injections and surgery.

MODERATOR MC LAUGHLIN: Thank you, Dr. Steinbrocker!

We have some questions here for the panelists, and we would be pleased if the audience would submit more—and the more difficult the better.

The first question, addressed to Dr. Patterson, is one I was going to ask him. It says, "Please discuss the technique of shoulder injection." I have long held the concept, corroborated many times in the operating room, that these acute calcium deposits susceptible to injection are in reality a chemical furuncle, and that curative treatment either by knife or needle is merely one form of lancing the boil. I should like Dr. Patterson to comment on that.

DR. PATTERSON: When I mentioned the various contraindications to needling, I simply stated what instruments we used. In the average patient, the procedure can be and is done in the emergency or treatment room. It certainly requires sterile technique because we have seen unpleasant results when this is not scrupulously adhered to. As anyone who has dealt with patients suffering from acute shoulder knows, it is not unusual for them to report suffering from stomach upset as the result of sedatives already taken to relieve the almost insupportable pain. As I already mentioned, the calcium deposits automatically disappear from 80 per cent of this group, and this procedure attempts to rupture the calcium from the tendon in the floor of the bursa.

My statement about the use of steroids in the region was made in

a negative way since we do not recommend the local use of hydrocortisone or other steroid in or about the shoulder when there is a calcium deposit because it is ineffective. Accordingly it may become necessary to remove mechanically the deposit that Dr. McLaughlin mentioned. The tendon can be incised and a tremendous amount of white toothpaste-like material will escape. It tends to rupture in the liquefying stage and the acute pain for the two or three days after onset is due to a distention of the tendon in its attempt to break out. Needling of the shoulder is not without pain even when the area has previously been injected with procaine. We inject from 2 to 3 cc. of 1 per cent procaine without adrenalin into the skin and into the region of the bursa, preferably into the area of the local point of tenderness. We try to have the patient move the arm. Splints are applied at the side in internal rotation. The patient is placed in a half sitting position. When in a supine position in bed the shoulder automatically drops back into extension and a tremendous amount of pressure is placed on the bursa. If the injection is made while the patient is lying in this position on the table he has such great discomfort that he derives no benefit from the procedure. So with the patient partially sitting up we infiltrate the shoulder with a fine needle and wait until the procaine has had some effect. Following this we prefer to use an 18-gauge needle, not too large and certainly not too small, and about 2 inches long so it does not wobble. We push the needle down to the spot of tenderness; when this spot is struck and the calcium deposit is reached, it is painful. However, if it is in the liquefying stage it frequently pushes back into the syringe. That is the reason for using the 2 cc. syringe which reduces the friction to a minimum. When we see calcium in the syringe we are pleased because this indicates relief of the intrabursal tension. Such a patient would probably have recovered in any event but he has been helped over a rough period of a few days. If the material is still in the tendon, and trying to rupture, then you have done what Dr. McLaughlin said: you have incised the calcific furuncle. Following this we leave the shoulder alone. We place a small dressing over the site of injection but do not apply a sling. We recommend that the patient go home and use the arm. With the arm at rest many are comfortable the first night but some are not.

MODERATOR MC LAUGHLIN: *You said the patient with an acute deposit would have been better in a few days. I agree. On the average, how*

many days do you think it takes him to get better spontaneously in an acute attack, with or without treatment, and what relation does this bear to palliative treatment, and may I include the steroids in palliative treatment?

DR. PATTERSON: I have seen a shoulder that has had acute symptoms of only 24 hours, or 12 hours, or merely a period of overnight, with calcium deposit present on x-ray. Should a person hang on a strap in the bus or subway going home at night, he may get a little twist, and then suffer an acute attack by morning. Usually it is a little later than that, but it can occur, and that patient may be miserable and uncomfortable for as long as two weeks. He can also get better in three days. I don't know the answer to how long it generally takes. I know our job as surgeons and therapists is to do something to relieve a patient's symptoms during an acute stage.

MODERATOR MC LAUGHLIN: *Would you say spontaneous relief usually occurs within two weeks?*

DR. PATTERSON: I should say so, yes.

MODERATOR MC LAUGHLIN: *Dr. Schlesinger, there is a question here requesting you to discuss the scalenus anticus syndrome.*

DR. SCHLESINGER: The scalenus anticus syndrome is very close to my heart because when I was young I was met at the train at the Mayo Clinic by Alfred Adson, who was then chief of Neurosurgery there. He took me to his office and looked me over from head to foot, and then said, "Young man, who described the scalenus anticus syndrome?" With my usual aptitude I said, "Howard Nefziger," which, of course, was wrong because Alfred Adson was the man who had described it. You may be sure that point was burned on my mind indelibly from then on. At that time it was one of the commonest diagnoses in the shoulder-neck region. A great many scalenotomies were done by orthopedists, general surgeons and neurosurgeons. It is of interest that probably the single most uncommon operation done on a large neurosurgical service today is the scalenus anticus operation.

The scalenus anticus syndrome was originally a syndrome which explained any radiating or severe pain in the arm. Today, of course, it is a more rigidly defined syndrome. The radiating pain is usually on the ulnar side of the hand because when the scalenus muscle clamps down it is much more likely to press on the cords involving ulnar function. It is almost axiomatic that the radiation of pain and numbness

is on the ulnar side of the hand. This is frequently associated with vascular signs such as edema and mottling. The signs and symptoms are accentuated by any maneuver which further compresses the neurovascular structures in the supraclavicular region. Today, of course, we recognize this clinical picture as ordinarily being a secondary one. As an analogy I would like to mention the low back syndrome. In this symptom-complex the erector spinae muscles splint the lower spine in an attempt to brace the patient. The scalenus reacts in the same fashion when a patient has hard pain, for whatever reason,—cervical disc or other pathology. All of the muscles of the neck attempt to minimize motion by splinting. These include not only the posterior cervical muscles but also the anterior scalenus and sterno-cleidomastoid muscles. When the scalenus splints it compresses underlying neurovascular structures, resulting in the typical scalenus anticus syndrome. It does not occur as a primary entity unless there is some unusual anatomical feature such as a cervical rib underneath or a special anomaly which makes it possible for a splinted scalenus to compress the brachial plexus and vascular structures. We often see a typical radiation of 6th cervical root pain into the first finger accompanied to a puzzling degree by ulnar signs. As soon as one relieves the compression of C-6 by proper attention to traction and by analgesics one finds that the aching in the ulnar side region and the pulse changes disappear spontaneously. Several years ago a paper was read suggesting that every cervical disc should first be treated by scalenotomy because so many got well after this procedure was done. I would broaden that idea by saying that every cervical disc should be treated conservatively until it is proven that it won't respond at all. I think that is a far more reasonable approach than to do a scalenus operation in the hope that it will minimize the secondary phenomena of the disc syndrome.

To sum up then, the scalenus anticus syndrome and cervical rib syndrome are much less popular as primary entities than they used to be. Once they were a part of the vague catch-all that I touched on lightly earlier which included all the outlet syndromes and syndromes secondary to use, abnormal posture and compression of vessels. As a primary entity it is a very rare diagnosis. Cervical rib is positive, can be proven by x-ray, and is anatomically very real. Scalenus is uncommon, ordinarily secondary, and most suspect as a lesion, and one should pull up very short before any large group of cases which have been

treated by scalenotomy. I believe it is too vague and too uncommon as a primary entity to deserve being mentioned in this group of problems here to-day.

MODERATOR MC LAUGHLIN: Thank you, Dr. Schlesinger.

I think we have time for one more question, and I am going to make it a tough one if I can. Dr. Steinbrocker, consider the normal shoulder, consider the tremendous number of normal shoulders which become frozen coincident with conditions such as a chronic painful neck, a superior sulcus lesion, pulmonary tuberculosis, cardiac disease; and consider, if you will, one frozen shoulder which proved intractable for two and one-half years until we removed a retrocecal appendix, following which the shoulder recovered spontaneously in six weeks. Consider the shoulders in middle aged people which stiffen after they are in a sling because of some lesion in the hand or wrist. What is the connection between the frozen shoulder and these various distant lesions, and how can it be prevented?

DR. STEINBROCKER: I will have to modify your question, Dr. McLaughlin, if you don't mind, to the extent of assuming that you are referring to frozen shoulders which are associated with visceral lesions at all times, not the ordinary frozen shoulder, the every-day frozen shoulder, for which there is no apparent accounting. I presume that it is those that occur in association with visceral lesions that you would like me to discuss.

The explanation for this is one that has been advanced by workers in the field of neurophysiology. It has to have such a technical basis which is beyond our own every-day understanding. We must depend upon those who are working in that particular area to give us some explanation so that we can plan therapy intelligently. The current most rational basis for this is the theory of "the internuncial pool" which presupposes that a lesion or injury of tissue produces a constant flow of stimuli to the spinal cord; that these stimuli find their way through various short and long channels from the posterior horns where they enter, to and through the exits in the nerve pathways at the lateral and anterior horns, the vasomotor and motor pathways. The nerve stations in the cord are at different distances and therefore discharge pathways of various lengths are set up so that, as the result of these variations, there is a constant flow of stimuli. This theory also assumes that once a lesion is produced, whether internal or external insult to tissue, these

stimuli go on and keep this reaction going. The effect from the lateral horns is to produce the sympathetic phenomena that go with this condition. Presumably something like that occurs in the shoulder. It has not been established yet. Certainly the motor phenomena do occur, the muscle spasm and the disability which is associated with it, as the result of flow of responses or stimuli through the anterior horn or motor cells. I don't know how else that could be explained. It is true that the pathologic changes in the frozen shoulder or frozen-like shoulder associated with visceral lesions are not much different, in my understanding of the work of those who have examined such tissues, from the frozen shoulder tissues in those conditions where there is no visceral lesion associated. However, we must go by the clinical picture. It is certainly significant that in a high percentage of patients with myocardial infarction, in a high percentage of patients with pulmonary lesions, the periarticular type of "bursitis", called the frozen shoulder, does occur. What the underlying mechanism may be is still a big mystery to me. I am merely accepting what has seemed the most plausible explanation. There are several which I think are almost as plausible and all of them are based on experimental evidence.

MODERATOR MC LAUGHLIN: *Would you agree with the concept that no shoulder will ever stiffen no matter what is wrong with it or the patient so long as it keeps moving; and as a corollary, that the immediate cause for almost every frozen or stiffened shoulder is prolonged dependencies of the arm?*

DR. STEINBROCKER: I would say that it undoubtedly is the greatest factor. I honestly cannot say that no shoulder would stiffen. I think some of these are completely beyond our control. There is a powerful dynamic process going on there, which, in spite of all of our efforts in some of our patients, has not prevented the difficulty. Probably we don't know what to do in the more severe cases, so that is why they get beyond us. On the whole I would agree with that statement.

MODERATOR MC LAUGHLIN: *We have three questions not answered. In the interest of brevity I shall attempt to answer them and ask for differences of opinion from the panel, if there are any. No. 1: What is the efficacy of nerve block in the treatment of painful shoulder? I would say that a nerve block, assuming that by this is meant transverse scapular nerve block, is a temporary palliative measure. Do you agree?*

Does ultrasonic therapy offer anything new in the shoulder bursitis?

The answer is I don't know. Does anybody know?

DR. PATTERSON: I think half of New York is overcooked.

MODERATOR MC LAUGHLIN: *Does the panel agree that a negative x-ray for calcium deposit absolutely excludes the diagnosis of so-called subdeltoid bursitis? Dr. Patterson said he would never operate without a calcium deposit on x-ray examination. I think Dr. Patterson would agree there is no such term as "absolute" in medicine, but that an adequate negative x-ray pretty well excludes all except very small deposits.*

DR. PATTERSON: I think that the deposits which have previously ruptured during the period of the preceding few days may be milky and very thin textured. One can put a needle in some of those shoulders and extract calcium even though the x-ray is negative.

MODERATOR MC LAUGHLIN: Ladies and Gentlemen, thank you for your attention, and many thanks to the three panelists.